LOGSHEET FOR FIELD CHANGES TO CONTROLLED DOCUMENTS

Change Number	Date	Document Number	Document Title	Section/Page Modified	Description of Change (s)	Resp. Manager Approval	Compliance Approval	ESH&Q Approval	Rad. Eng. Approval	Quality Assurance	Completion of ADM 2.01 Checklist	Completion of SES/USOD Checklist
1	9/9/98	RFI/RMRS-97-084	Final SAP for the Characterization of the 903 Drum Storage Area, 903 Pad Area, + Ambient Air	3.1.1/ 32+34	Modified FOV for HPGe to reflect ISOCS equip. + Maintain DQO's	MEWood 9/9/98	NA	NA			yes	yes

ADMIN RECORD

1112-A-00016

2.7.2 Subsurface Soils

Determination of the vertical and thus the areal distribution of radiological contaminants will be optimized through a "step-out" boring approach. This will be implemented by the placement of a boring half way between locations exhibiting radiological contaminants above and below Tier I soil action levels respectively. Only one "step-out" boring will be completed per original grid sample location, as needed.

Determination of the vertical and areal extent of VOC contaminants will be optimized through a "step-out" boring approach. This will be implemented by the placement of a boring upgradient of a boring with analytical results indicating VOCs are above 10 % of the RFCA Tier I action level. The sampling grid will be extended an additional 6.1 m (20 ft) in an upgradient direction (based on the potentiometric surface, [DOE, 1995]) of that location and additional samples will be collected for laboratory analysis.

3.0 SAMPLING AND ANALYSES - STRATEGY AND DESIGN

Radiological contamination in the Americium Zone surface soils will be evaluated using HPGe *in situ* gamma-ray spectrometry methodology. Subsurface soil samples will be collected to further refine the depth of radiological contamination. HPGe results will be correlated to radiochemical data by the analysis of surface soil samples collected from 6 HPGe survey measurement locations. The soil samples will be collected over the same depth interval as the HPGe measurement.

The vertical and lateral extent of radiological and VOC contamination at the 903 Pad and Lip Area will be assessed utilizing Geoprobe® or conventional hollow-stem auger drilling techniques to collect subsurface soil samples for analysis. Asphalt samples from the 903 Pad will be collected to obtain a preliminary waste characterization data for disposal purposes. Field activities will be performed in accordance with FO.1, Air Monitoring and Particulate Control.

3.1 Radiological Contamination

The areal extent of radiological surface soil contamination will be primarily assessed using a non-intrusive *in situ* gamma-ray spectrometry techniques (i.e., HPGe survey) and collection of surface soil samples for isotopic laboratory analysis for correlation of the HPGe results. Vertical

and areal extent of radiological contamination will be assessed with subsurface soil samples submitted for isotopic laboratory analysis using gamma and alpha spectrometric methods. Follow-up FIDLER surveys may be performed to further refine the areal extent of radiological contamination.

3.1.1 Surface Soil Investigation

The surface soil investigations will be implemented by performing an HPGe survey and collecting surface soil samples at HPGe measurement locations with predetermined ^{241}Am activities. The soil sample results and HPGe measurement results will be correlated to estimate activities of radionuclides for input into the RFCA sum of ratios equation.

Field Preparation - Reference stakes for the HPGe grid will be placed in the field before and during data collection activities. From these stakes, the HPGe survey grid will be laid out using manual methods, at the 13 m triangular grid spacing specified below. Each measurement point will be staked, flagged, and numbered for reference by the HPGe crew.

HPGe Survey - The HPGe survey will be initiated in the Americium Zone adjacent to the Lip Area's eastern boundary in this area and proceed eastward. Subsurface soil results are required in the Lip Area prior to performing the HPGe survey. In the Lip Area it will be assumed that if subsurface soil contamination exists, the overlying surface soils will require similar remedial action and these soils and will be included into the volume estimate of soil exceeding the Tier I action level. HPGe surveys will therefore not be required in portions of the Lip Area where subsurface soils were sampled as part of this SAP. Figure 3.1 shows the configuration of a typical HPGe survey grid.

The HPGe system will be used to determine the average ^{241}Am, ^{238}U and ^{235}U activity over a FOV with a diameter of 10 meters (33 ft) and an area of 79 m^2 (907 ft^2) with an appropriate detector height of approximately 1 m (3.28 ft) above the ground surface. Thus the EA has been defined to be single HPGe measurement with a FOV of 10 m (33 ft) in diameter. A 10.5 m triangular grid spacing to achieve 80% coverage which translates to 1260 HPGe measurements for complete coverage of the investigation area. Table 3.1 provides an estimate of the number of HPGe measurements proposed in the Lip Area and Americium Zone (assuming full coverage is required).

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Table 3.1 Surface Soil Investigation - Field Program

Area	HPGe Measurements (Estimated)	Surface Soil Samples[1] (Estimated)
903 Pad	0	0
Lip Area	220	0
Americium Zone	1040	18 (6 locations)

[1] = A minimum of 18 surface soil samples will collected to correlate HPGe measurements.

Measurement count times will be approximately 15 minutes to ensure a 95% confidence level of the HPGe to determine ^{241}Am activities in soils to 1 pCi/g. Complete HPGe coverage of the proposed Investigation Area, if required, is estimated to require approximately 1,500 measurements. The HPGe survey will be discontinued in a given direction when two consecutive and adjacent measurements are less than 10 pCi/g ^{241}Am. Soil moisture measurements will be collected from a representative area. The number of samples required will be determined based on variability of initial measurements and environmental parameters (i.e., precipitation). HPGe locations and elevations will be surveyed by land survey methods or with a Global Positioning System (GPS) operated in accordance with the manufacturers specifications.

FIDLER Surveys - A follow-on FIDLER survey may be conducted in selected areas where contiguous or isolated HPGe measurements exceed the 10 pCi/g ^{241}Am decision level . An evaluation of the nature of the exceedence will be conducted to determine if detailed FIDLER surveys are required. If an HPGe measurement for an individual FOV is above the decision level, and adjacent FOVs are below the decision level, a FIDLER survey will be conducted to determine if the high FOV measurement is caused by the presence of a smaller area containing a hot spot. In addition, detailed FIDLER surveys will be conducted at three locations where HPGe measurements for individual and surrounding FOVs exceed the RFCA Tier I action level. The purpose of the survey is to determine whether the contamination is homogeneous and widespread as suggested by the conceptual model, or heterogeneous and consists of numerous individual hot spots.

A grid with four-foot spacings will be staked in the field for the FIDLER survey. While all available data will be used to determine whether a FIDLER survey is required, it is anticipated that these will be conducted only in areas where HPGe measurements are above the decision level of 10 pCi/g, ^{241}Am. When performing a FIDLER survey, measurements will be taken with the instrument placed on the ground surface at each of the four-foot grid nodes. When walking between grid nodes, the operators will move their instruments slowly and observe the instrument response between readings. If a sharp increase in the reading is seen between grid nodes, the surrounding area will be investigated. The FIDLER surveys will be conducted in accordance with Radiological Operating Instructions (ROI) Manual, 4-H58-ROI-06.6, Use of Bicron FIDLER and will be used to locate smaller areas of increased radiological activity such as would be caused by a hot spot.

The FIDLER readings will be used to define localized areas with higher readings and will be marked as potential hot spots. Potential hot spots and areas of higher concentrations identified during the hand-held FIDLER survey will then be staked, surveyed and labeled for future evaluation. For each hot spot, additional soil samples may be collected for isotopic analysis if it is determined that this information is necessary to determine whether a remedial action is required, or to disposition the soil from a remedial action.

Surface Soil Samples - Surface soil samples will be collected using a geometry developed by the DOE (DOE, 1997b) at the Fernald Environmental Management Project site in Ohio in an effort to correlate HPGe results to surface soil results. The sampling method involves the collection of a set of soil subsamples for a given HPGe measurement FOV for laboratory analysis. The location and number of subsamples collected relative to HPGe measurements is based on the theory of *in situ* gamma-ray spectroscopy and is expected to be representative of radionuclide contamination over the FOV. Figure 3.2 provides the surface soil sampling scheme for collection of the soil sample. Up to 15 grab samples will be collected at a selected HPGe location; one grab sample from the center; four grab samples collected at 1 m radius, and ten grab samples from 3 m radius. The 1 and 3 m radius grab samples will be composited into a 1 m and 3 m sample representative of the individual band. Therefore, three separate gamma and alpha spectroscopy analyses will be performed at each selected HPGe location.